NTT DoCoMo
Do Communications
Over The Mobile Network

R & D Vision

Challenges and Opportunities for Broadband Mobile Media in the Next Decade

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Disclaimer

■This presentation does not represent the view of NTT DoCoMo.

■Slides are from my sole view for which I will take full ethical responsibility.

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R & D Vision

2

http://www.lenoxx.com/2005/Cassette%20BoomBoxes/IMAGES/ct-995.jpg

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3

Summary of My Sole View

■ **Value Chain Aspects in Convergent Services (e.g., FMBC)**

Who gets the value?   The value to end-users is given.

Zero-sum game for most of convergent services.
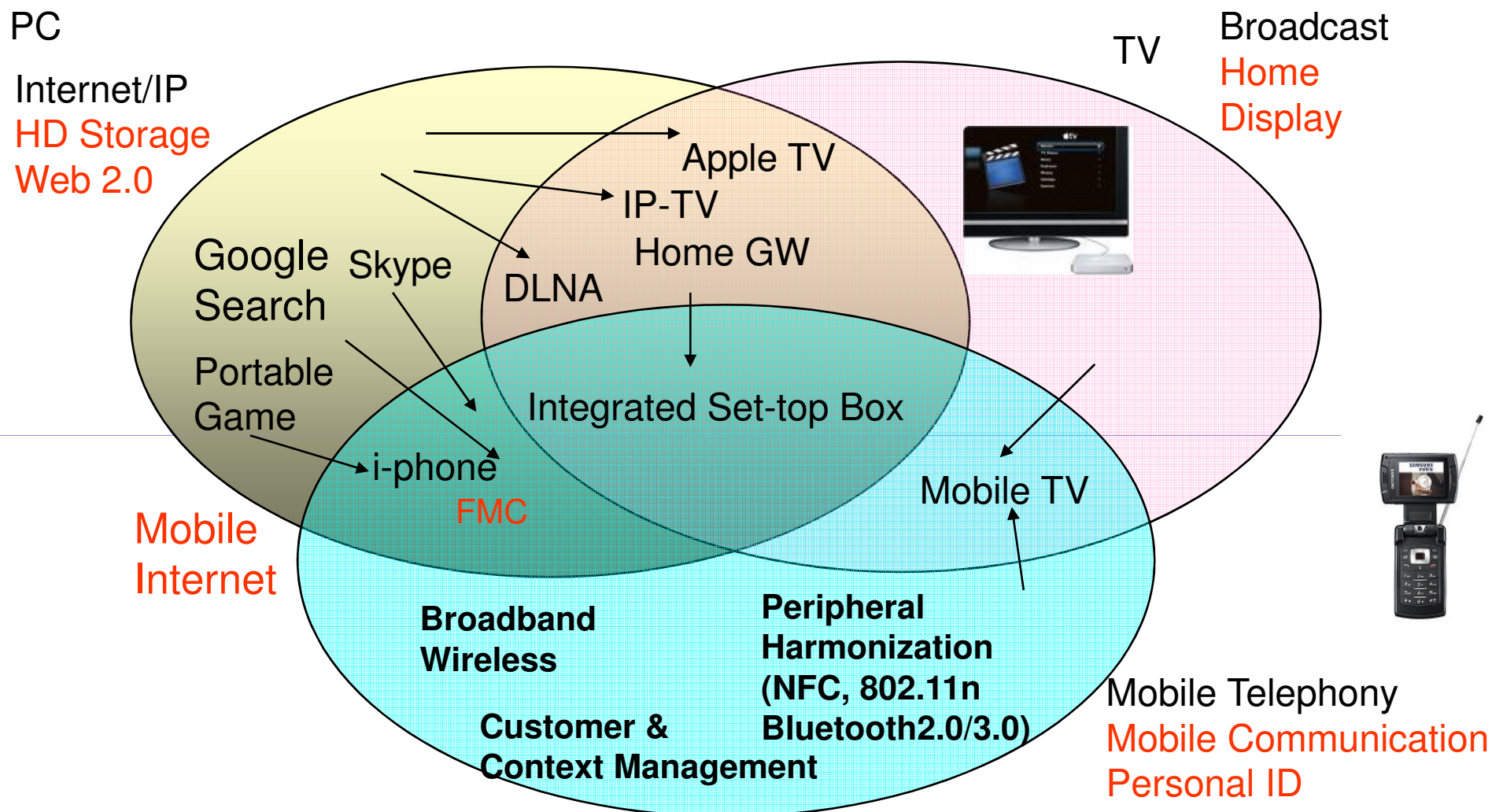
Convergence remains just at network economics.

■ **Opportunities (Content Delivery -Centric View):**

Interaction with Individuals in real-time with

        Personalization based on Profiling, Geographic Information, Personal ID, etc…., AAA.

■ **Technical Challenges: Terminal-Network Architecture**
for Seamless Integration & Connectivity at many levels rather than Bundling

- ◆ ID management, Context management, DRM
- ◆ Broadband mobile Internet (that substitutes fixed-lines)
- ◆ Peripheral harmonization through PAN
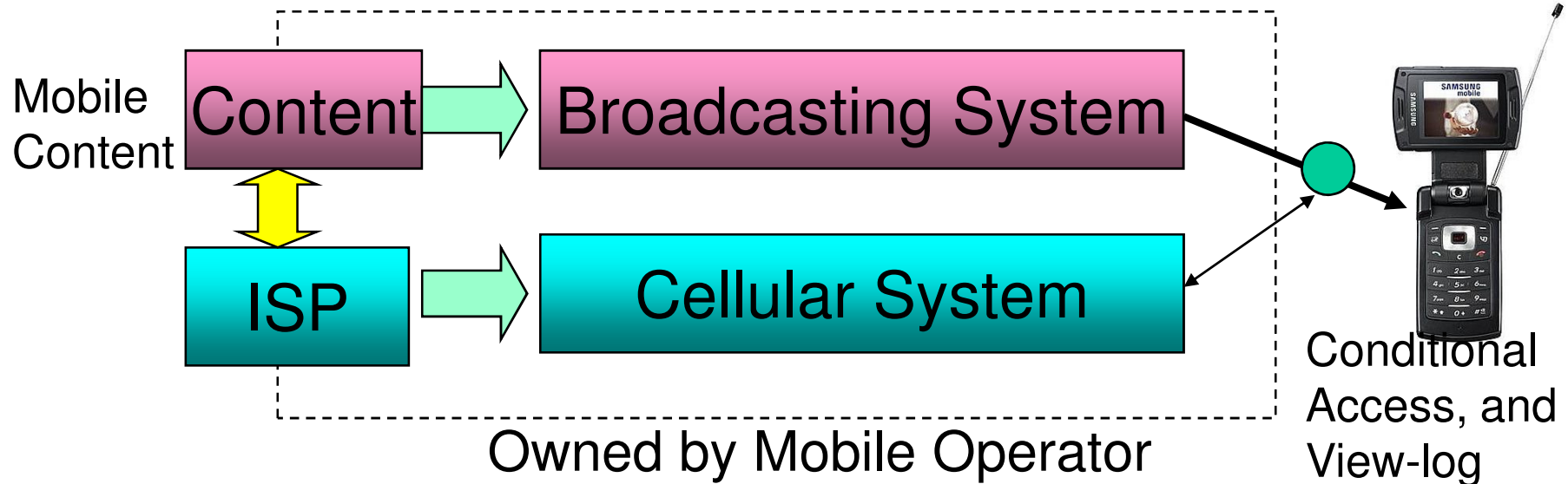
Big Picture for Convergence

PC

Internet/IP
HD Storage
Web 2.0

TV

Broadcast
Home
Display

Google Search   Skype

Apple TV
IP-TV
Home GW

DLNA

Integrated Set-top Box

Portable Game

i-phone
FMC

Mobile TV

Mobile Internet

Broadband Wireless

Peripheral Harmonization (NFC, 802.11n Bluetooth2.0/3.0)

Customer & Context Management

Mobile Telephony
Mobile Communication
Personal ID

KEY: inclusion of mobile functionalities to new value-added services.

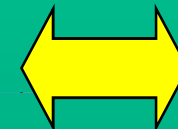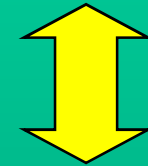NTT DoCoMo

ISTB-T v.s. DVB-H

Free Simulcasted TV Programs

Content → Broadcasting System

Broadcasters

Related URL

Mobile Operators

ISP ↔ Cellular System

URL Access

Exclusive Pay-Program

Mobile Content

Content → Broadcasting System

ISP → Cellular System

Conditional Access, and View-log

Owned by Mobile Operator

6

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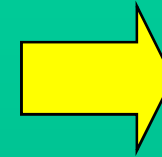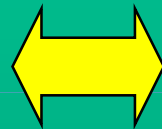
Generalization

Integrated System

Interaction, Personalization, Bill Management, Context (e.g., GPS data)

New Value: Three-Screen concept (with Personalization) for more Pay-View, Mobile E-commerce, Targeted Advertisement,

Example: Personal IP-TV = Usual TV + Interactive Services + Targeted Advertising + Personal PayPerView

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Continuous Progress of Wireless Access Capacity

**Wireless access speed follows quasi-Moore's Low.
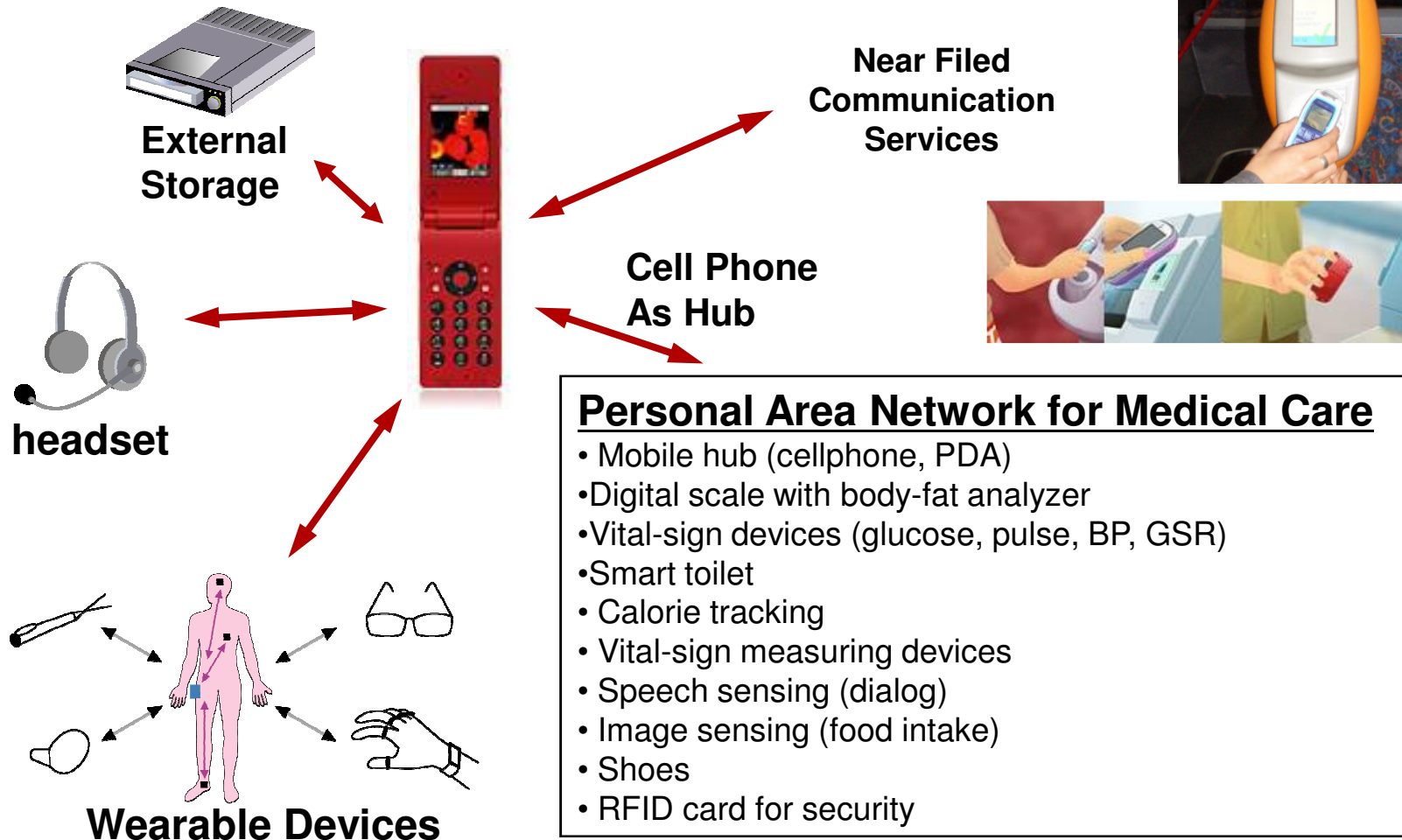It doubles every two years.**
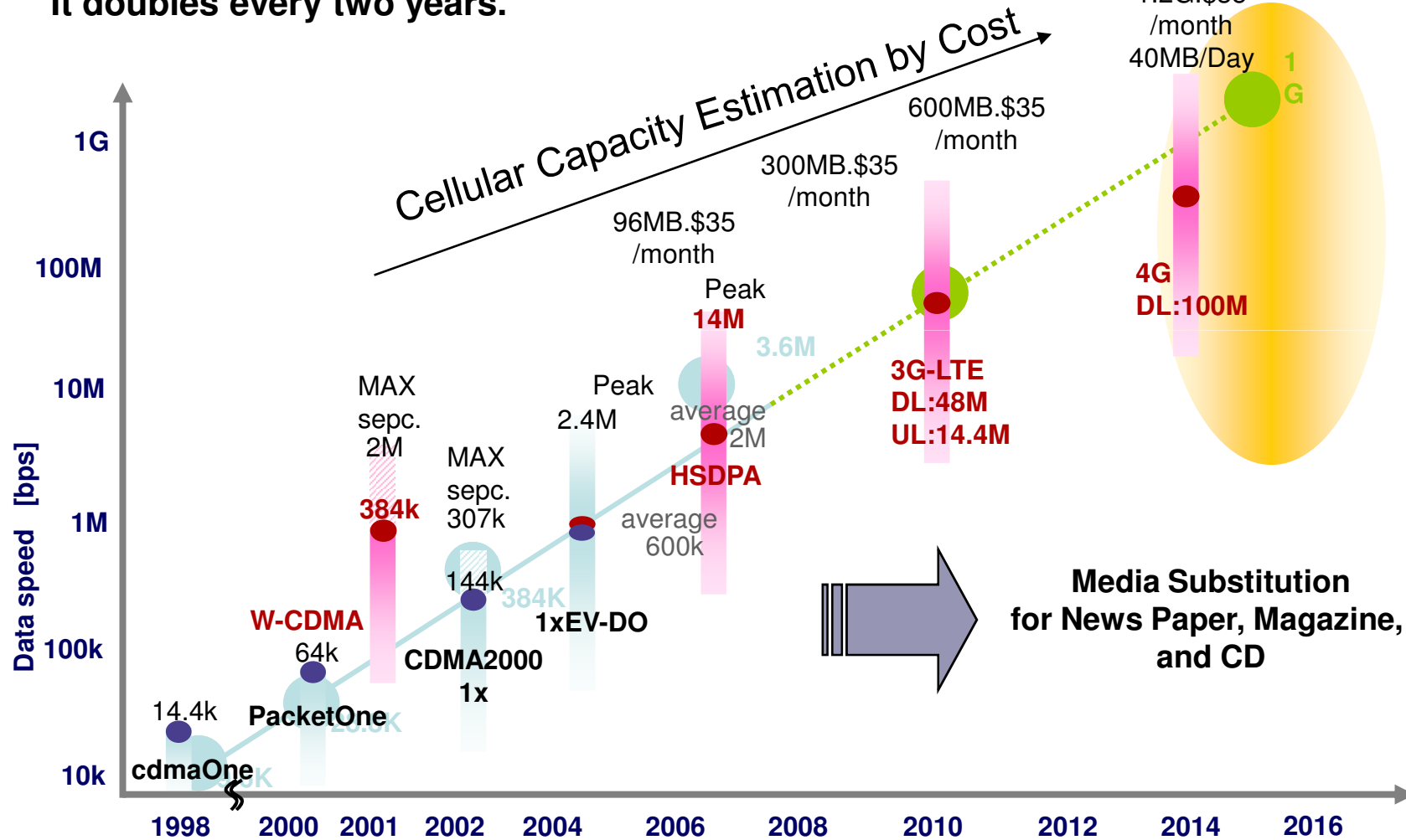
Convergence and Divergence: Application-Oriented Network Heterogeneity

Trend 1. pervasive interaction with authenticated services

Trend 2. short range communication for special purposes

External Storage

Near Filed Communication Services

headset

Cell Phone As Hub

Personal Area Network for Medical Care
- Mobile hub (cellphone, PDA)
- Digital scale with body-fat analyzer
- Vital-sign devices (glucose, pulse, BP, GSR)
- Smart toilet
- Calorie tracking
- Vital-sign measuring devices
- Speech sensing (dialog)
- Image sensing (food intake)
- Shoes
- RFID card for security

Wearable Devices

R & D Vision

Summary (Recapitulated)

■Value Chain Aspects in Convergent Services (e.g., FMBC)

Who gets the value?   The value to end-users is given.

Zero-sum game for most of convergent services.

Convergence remains just at network economics.

■Opportunities (Content Delivery -Centric View):

Three-Screen concept (with Personalization) for more Pay-View,

Mobile E-commerce,

Targeted Advertisement.

■Technical Challenges: Terminal-Network Architecture

for Integration & Seamless Connectivity at many levels rather than Bundling

- ◆ ID management, Context management, DRM
- ◆ Broadband Mobile Internet (that substitutes fixed-lines)
- ◆ Peripheral harmonization through PAN, and context (incl. GPS)

with Efficient Power Usage

Backup Slides

Mobile Services, Today   in Japan
(as of late 2006)

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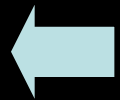| **Music** | Unlimited access to 1.5 million songs. (DoCoMo) |
Games	SONY Playstation 1 level 3D graphics
mobile TV	3 models offering Japan's largest screen cellphone TV (DoCoMo)
e-Wallet	Train ticket, easy data exchange between handsets.
Security	New Service for locating misplaced handsets.
GPS	Built-in navigation and increased functionality
Mail	attachments up to 2MB.
New Content	Dress-up Tool and Animation Avator
Global Services	More 3G roaming models.

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Key Mobile TV solutions overview

	2.5G / 3G	DVB-H	Media FLO	DMB	ISDB-T
Brief description	(W-CDMA.EV. DOnetworks)	Digital Video Broadcasting-Handheld	Forward Link Only	Digital Mobile Broadcasting	Terrestrial Integrated Services Digital Broadcasting
Broadcasting	Terrestrial	Terrestrial	Terrestrial	Terrestrial or Satellite	Terrestrial
Location	Europe, North America	Europe, North America, Asia	USA	South Korea	Japan
Current Status	Operational	Operationa in Italyl	Test	Operational	Operational
Strengths	· Unlimited number of channels · Energy consumption less than with broadcast · Existing network	· Image, quality · Network cost per kb is 10 to 20 times less than with UMTS	· Up to 20 simulators video channels · Can be added on existing 3G Networks	· Reception possible at high speed · Freq already available · Requires fewer transfers than DVB-H	· Same advantages as DVB-H and DMB · Enables spontaneous broadcasting to mobiles added domestic TV
Weaknesses	· Network size · Costs related to number of users	· High network density necessary (problems of "indoor" cover) · Freq must be found · No existing network · Limited number of	· Qualcomm progenitor technology	· Limited number of channels (even less than DVB-H)	· Specific to Japan

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Nationwide Service in Japan

Broadcaster
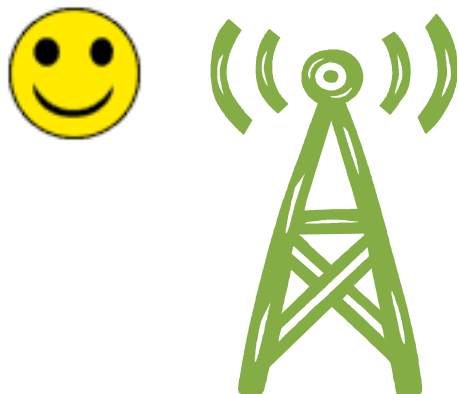
12 segments for digital TV set

6 MHz
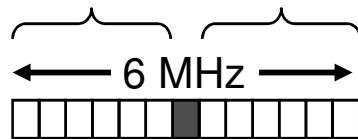
1 segment prepared for Mobile terminal

Content Provider

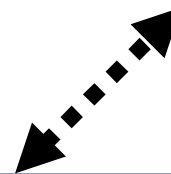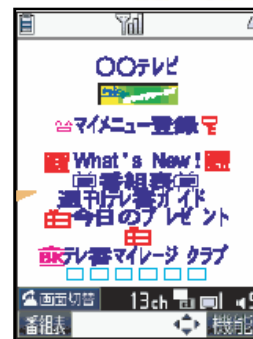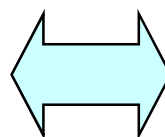Digital Broadcasting

Internet

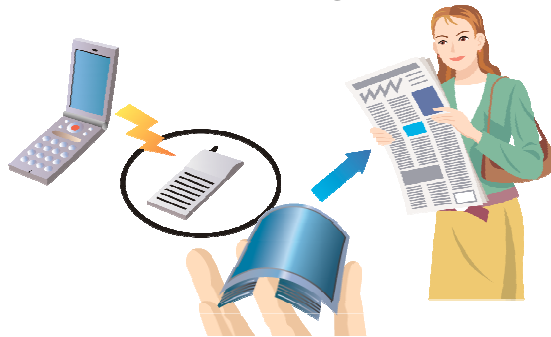Mobile Operator

End User

Broadcasted TV Program

Related WWW access

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Applications in 2015

"Broadband Anywhere" cellular network will change our life by replacing the existing media delivery scheme

Mobile Magazine

Cellphone will become the digital identity that connects the real identity (i.e., individual itself) to virtual world through the local communication and biometrics.
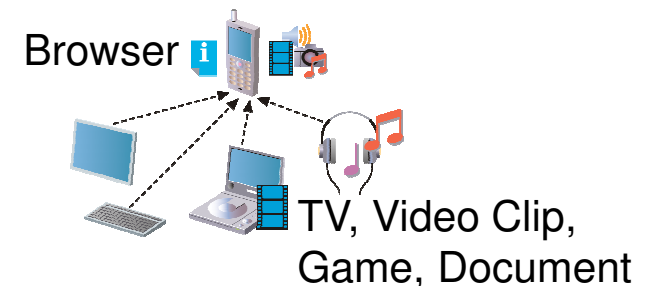
Digital Passport

ID
Authentication

Collaborative use of cellular and local communications will provide "Super Distribution"

Movie Anytime

Cellphone is extended by near devices through secure PnP and local communication. Cellphone becomes a control hub and AAA core.

Service Coordination with Local Devices

Browser

TV, Video Clip, Game, Document

16

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We may have functional separation of interfacing devices from Keitai.

● **Wearable Device for
only Speech Communication**

● **E-mail Communicator
Of Black Berry Type**

● **Headphone
for Speech Communication
with Music Entertainment**

● **Smartphone**

8" display

A4 Size

■ **HD Display**

★ **Paper Display**

■ **Video Conference Station**

★ **Wrist-watch style**

■ **Pen Camera**

● **E-mail communicator**

★ **Eyeglasses style**

● **head sets**

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Possible Wearable Displays

Office of Naval Research (ONR)
Fast Action HMD, USC &
Fakespace Labs (2005)
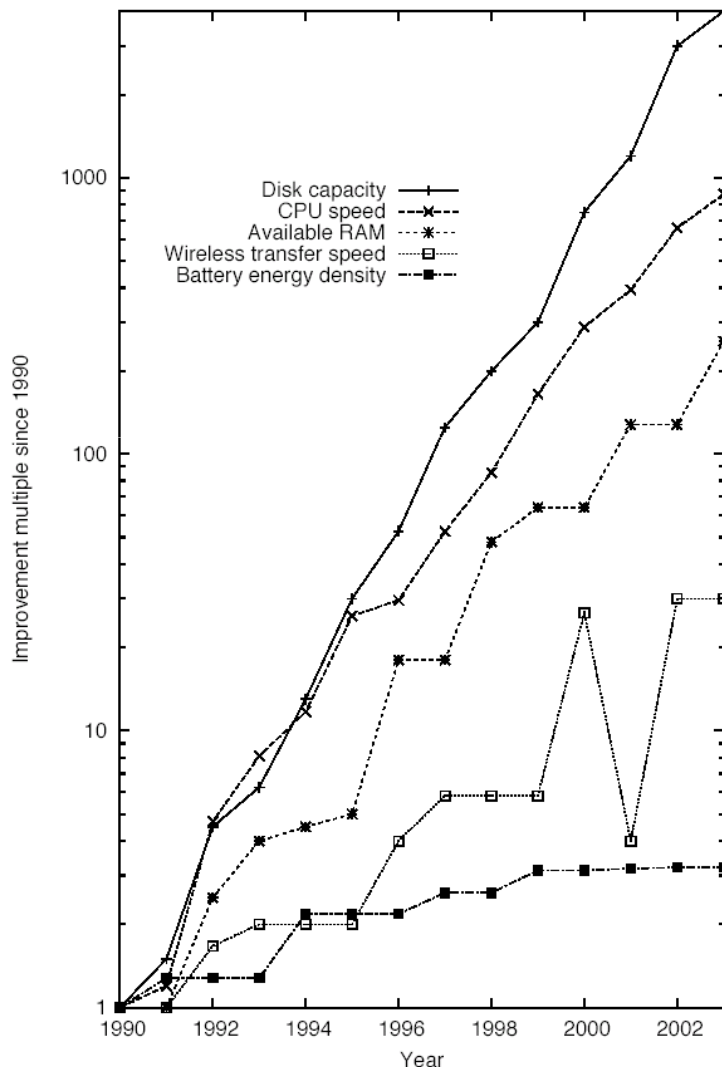   Low cost for CQB training
   140 to 180 degree field of view

MicroOptical Clip-on Display
   VGA resolution
   Color

Minolta Holographic See-thru Browser
   • QVGA resolution
   • Monochrome

Energy Starvation:
Moore's Law vs. Battery Capacity

Improvement multiple since 1990 (y-axis) vs Year (x-axis)
Legend: Disk capacity, CPU speed, Available RAM, Wireless transfer speed, Battery energy density

Quoted from, Paradiso, J.A. and Starner, T.,
"Energy Scavenging for Mobile & Wireless Electronics",
IEEE Pervasive Computing,4(1), 00. 18-27, 2005

CPU Speed
Double per 18 months by 2004

Gap!

Impossible to follow PC scenario

Battery Energy Density
Double per 12 years.

Possibilities:
1. exploit other chemical reactions
    Fuel Cells and Microengines
2. clever power management and circuit design
3. off-loading the burden from the terminal

DRM, DRM and DRM..

Broadcasting : Conditional Access System
Internet: Super Distribution   Models.
Convergence or Divergence?

	WMDRM	Fairplay	OpenMG	OMA DRM	Marlin	None
Proponents	Microsoft	Apple	Sony	Open Mobile Alliance	Marlin Developer Community	All the others
Enabled Services	Napster, mora(Label Gate), HMV DIGITAL, MSN Music (Microsoft), Ongen(fixed line), Yahoo movie etc.	iTMS	Yahoo! Music, mora(Label Gate), bitmusic(sony)	Ver 1: Vodafone Live! BB , T-Online(T-Mobile), O2 Music(O2) V r er 2: Musiwave (as of Dec. 2006)	TV portal	EMI Music Distributio n via iTMS
PC Software Clients	Windows Media Player Napster Application	iTunes	SonicStage, BeatJam	v1, v2: N.A. ?	??	Many
Portable devices.	gigabeat , iriver, CREATIVE Zen、 Rio, Cell phones	iPod	SONY products.	V1: Nokia、 Sony Ericsson V2: Nokia S60 series	??	Many
My bet	??	??				Two cents

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